Appendix C
Errata (November, 2023)

With regret, I have to mention the following errors:

- p. 54: “...an exponential random variable with rate \( \sum_{k=0}^{m} \alpha_k \)” should be “...with rate \( \sum_{k=1}^{m} \alpha_k \)”.
- p. 60: “...the Internet has an exponent around \( \alpha = 2.4 \)” should be “...the Internet has an exponent around \( \alpha = 1.4 \)”.
- p. 140: “why \( \lambda \) is called the rate ... or the number of events per time unit” should be “why \( \lambda \) is called the rate ... or the average number of events per time unit”.
- p. 143: the second “equality” should be an “inequality”, thus
  \[
  \sum_{j=2}^{n} P_{n-j}(t) \Pr \{N(h) = j\} \leq \sum_{j=2}^{n} \Pr \{N(h) = j\} \leq \Pr \{N(h) > 1\} = o(h)
  \]
- p. 155: (vi) (c): “If there was one VoiP in the meantime” should be “If there was one VoiP packet in the meantime”.
- p. 190: below (9.27): “the rectangular matrix \( R \) describes the transitions from the closed states to the transient states, while there are no transitions from the transient to the closed states” should be “the rectangular matrix \( R \) describes the transitions from the transient states to the closed states, while there are no transitions from the closed to the transient states”.
- p. 201: exercise (ii) implicitly assumed an infinite \( N \). For a finite \( N \), it must hold that \( P_{N,N} = 1 - \frac{1}{N} \) in order to obey the fundamental property \( P u = u \). In that case, the solution on p. 605 must contain a self-loop for state \( N \) with transition probability \( 1 - \frac{1}{N} \). In addition, the steady state of node \( N \) then equals \( \pi_N = N \frac{N-2}{N-1} \pi_{N-1} \) that only tends to 1 if \( N \to \infty \). In that limit, there are two absorbing states, one at zero and one at \( N \to \infty \).
- p. 202: exercise (ix): “... started in state \( j \)” should be “... started in state \( i \)”.
- p. 209: formula (10.19) should be \( P(t) = u \pi + \sum_{k=2}^{N} e^{-|Re\lambda_k|+i|Im\lambda_k|} x_k y_k^T \).
- p. 216: last equation in display “\( q_{ii} = 1 - \beta T_{ii} (\beta) \)” should be “\( q_{ii} = \beta - \beta T_{ii} (\beta) \)”.
- p. 217: second last equation in display “\( t_k(\beta)q_k = \sum_{k=1,k\neq j} t_k(\beta)q_k \)” should
be \( t_j(\beta)q_j = \sum_{k=1; k \neq j}^N t_k(\beta)q_kj \) and the line below “\( t_k(\beta) = \pi_k \)” is better replaced by “\( t_j(\beta) = \pi_j \).”

- p. 225, line 6: “\( p_2 \), or a link failure ...” should be “\( p_1 \), or a link failure ...”.

- p. 354, xiii): In the figure, \( p \) and \( q \) need to be reversed: \( p = 1/2 \) and \( q = 1/3 \).

- p. 370: line 11: “Nodes with low closeness have short hopcounts ...” should be “Nodes with high closeness have ...”.

- p. 372: the definition of \( \tilde{C}_G \) should be: six times the number \( \Delta_G \) of triangles divided by the number of connected triples,

\[
\tilde{C}_G = \frac{6\Delta_G}{N_2 - W_2} = \frac{W_3}{d^T d - 2L} = \frac{\text{trace}(A^3)}{\sum_{j=1}^N d_j(d_j - 1)}
\]

where \( N_k = u^T A^k u \) is the total number of walks with length \( k \) and \( W_k = \text{trace}(A^k) \) is the number of closed walks with length \( k \). Moreover, \( W_3 = 6\Delta_G \) and the number of connected triples equals the total number \( N_2 = d^T d \) of walks of length 2 minus the number \( W_2 = \text{trace}(A^2) = 2L \) of walks of length 2 between two nodes. The factor of 6 accounts for the fact that each triangle contributes to three connected triples of nodes, but six closed walks (three clockwise and three counterclockwise). For the complete graph \( K_N \) with \( \text{trace}(A^3) = (N-2)(N-1)N \) and \( \sum_{j=1}^N d_j(d_j - 1) = N(N-1)(N-2) \), we find, indeed, that the clustering coefficient \( \tilde{C}_G = 1 \).

- p. 417: line 3 from bottom: “Gummel” should be “Gumbel”.

- p. 440 (xi): there is a misprint in \( E[h] \): it should be \( E[h] = \frac{1}{m} \sum_{i=1}^m h_i \).

- p. 449: equation (17.7) should be (in particular, third line sum)

\[
q_{ij} = \begin{cases} 
\delta & \text{if } j = i - 2^{m-1}; m = 1, 2, \ldots, N \\
\varepsilon + \beta \sum_{k=1}^N a_{mk}x_k(i) & \text{if } j = i + 2^{m-1}; m = 1, 2, \ldots, N \\
- \sum_{k=0; k \neq j}^{N-1} q_{jk} & \text{if } i = j \\
0 & \text{otherwise}
\end{cases}
\]

- p. 451: line -8: “(a) if the node \( i \) is infected \( (X_i) \), then \( \frac{dE[X_i]}{dt} \) decreases ...” should be “then \( E[X_i(t)] \) decreases over time \( t \) with rate equal to the curing rate \( \delta \).”

- p. 457: The integral of after eq. (17.23) should have the opposite sign. Hence, (17.24) should be

\[
W(t) \leq e^{(\tau A - (1 + \varepsilon^*) I) t^*} W(0) - \varepsilon^* \left( \frac{I - e^{(\tau A - (1 + \varepsilon^*) I) u^*}}{\tau A - (1 + \varepsilon^*) I} \right) u
\]

and on p. 458, the tendency towards “\( \varepsilon^* \left\{ (\tau A - (1 + \varepsilon^*) I)^{-1} u \right\}_i \), ...” should be “\( \varepsilon^* \left\{ -(\tau A - (1 + \varepsilon^*) I)^{-1} u \right\}_i \), which is positive for \( \varepsilon^* > 0 \).”
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- p. 458: “decreases exponentially fast” should be “decreases exponentially fast for sufficiently large time”. This is a rather important observation, because in the star graph the prevalence can initially still increase with time, even if the effective infection rate \( \tau \) is below the epidemic threshold (see Van Mieghem, P., 2016, “Approximate formula and bounds for the time-varying SIS prevalence in networks”, Physical Review E, Vol. 93, No. 5, p. 052312.)

- p. 458: Theorem 17.3.2 is wrong. The reason is that in the proof the argument “In any graph \( \mathcal{G} \), the conditional probability

\[
\varepsilon_G = \lim_{y \to 10} \max_{(k,l) \in \mathcal{L}} \Pr[X_k = 1 | X_l = 1]
\]

can be upper bounded by \( \varepsilon_G \leq \varepsilon_{KN} \), because the infection probability \( \varepsilon_G \) on a link \((k,l)\) in the graph \( G \) is largest in the complete graph.” is not correct. For more information, I refer to my article “Approximate formula and bounds for the time-varying SIS prevalence in networks”, Physical Review E, Vol. 93, No. 5, p. 052312, 2016.

- p. 463 (bottom): the index \( j \) should be \( i \); the last equation is written for node \( i \) (and for node \( j \)).

- p. 465: in the proof: \( \sum_{j=1}^{N} a_{ij} h_i (k - 1) \) should be replaced by \( \sum_{j=1}^{N} a_{ij} h_j (k - 1) \) and, in the final line of the proof, “partial fraction” must be replaced by “continued fraction”.

- p. 594: B.5 (i): the first formula in display, \( \Pr[D_{\text{max}} \leq x] = \left( \left( \frac{x}{z} \right)^{-\alpha} \right)^N \), should be \( \Pr[D_{\text{max}} \leq x] = \left( 1 - \left( \frac{x}{z} \right)^{-\alpha} \right)^N \).

- p. 621, solution of problem (iv): “Solving this equation . . . yields \( \rho = \frac{P_B + \sqrt{2P_B - P_B^2}}{1 - P_B} \) should be “Solving this equation . . . yields \( r = \frac{P_B + \sqrt{2P_B - P_B^2}}{1 - P_B} \).

- p. 623: In Fig. B.9, the first three states 1,2,3 should be 0,1,2. The last state \( m \) is correct.

- p. 626, solution of problem xvi (a). Arrival rate \( \lambda = \frac{90 \times 7}{60 \times 8} = 1.3125 \) calls/minute, or, change the number of employees in the company from 90 to 120.

- p. 627, solution of problem xvi (c). The value of \( 5! \) should be 120, not 150.

- p. 656 in (xi): The size of the URT is \( m + 1 \), the root \( A \) and the \( m \) nearest neighbors, that are different from the root \( A \). The correct average hopcount (from (16.17)) should be

\[
E[h] = E[H_{N=m+1}] = \frac{m + m+1}{m} \sum_{l=2}^{m+1} \frac{1}{l}
\]
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